

ABSTRACT OF THE DISCLOSURE

A multilayer dielectric tunnel barrier structure and a method for its formation which may be used in non-volatile magnetic memory elements comprises an ALD deposited first nitride junction layer formed from one or more nitride monolayers i.e., AlN, an ALD deposited intermediate oxide junction layer formed from one or more oxide monolayers i.e., Al_xO_y , disposed on the first nitride junction layer, and an ALD deposited second nitride junction layer formed from one or more nitride monolayers i.e., AlN, disposed on top of the intermediate oxide junction layer. The multilayer tunnel barrier structure is formed by using atomic layer deposition techniques to provide improved tunneling characteristics while also providing anatomically smooth barrier interfaces.